

## ABSTRACT OF THE DISCLOSURE

The present invention provides a method and apparatus for manufacturing halogen gas using a plasma chemical reaction, with the features of having simplicity, practicality, and maintaining safety in handling source materials and of being able to manufacture halogen gas in the same facility where halogen gas is used, and also provides a halogen gas circulatory and recovery system capable of circulating and using halogen gas efficiently. After the gas expressed in the chemical formula  $A_iX_j$  (A represents metallic element or semiconductor element, X represents halogen element, and i and j represent integers) is introduced into a reaction container in vacuum, plasmas are generated in the reaction container to produce a plasma chemical reaction. Fine particles produced by the plasma chemical reaction and containing an element other than halogen element as the major constituent are removed from the reaction container so as to generate halogen gas in the reaction container.